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D1

a second optical region made of a second optical material which is substantially transparent to said light but is different from said first optical material and has a refractive index n_2;

a third optical region made of a third optical material which is transparent to said light but is different from said second optical material and has a refractive index n_3, said first, second and third optical regions being arranged to be brought into contact with each other or being arranged close to each other;

a first relief pattern formed in a boundary surface between said first and second optical regions and having a first pitch distribution; and

a second relief pattern formed in a boundary surface between said second and third optical regions and having a second pitch distribution which is substantially identical with said first pitch distribution of the first relief pattern, said first and second relief patterns being substantially aligned in a direction of an optical axis of the diffractive optical element, wherein

said first relief pattern has a wavelength dependent phase amplitude $a_1(\lambda)$, said second relief pattern has a wavelength dependent phase amplitude $a_2(\lambda)$, said diffractive element has a phase amplitude $a(\lambda)$ which is a sum of said phase amplitudes

Cl end

$a_1(\lambda)$ and $a_2(\lambda)$ and includes at least one peak value within the wavelength range to be used.

Cl2

40. (Twice Amended) A diffractive optical element comprising:

a first optical region made of a first optical material which is substantially transparent to light within a wavelength range to be used and has a refractive index n_1;

a second optical region made of a second optical material which is substantially transparent to said light but is different from said first optical material and has a refractive index n_2;

a third optical region made of a third optical material which is transparent to said light but is different from said second optical material and has a refractive index n_3, said first, second and third optical regions being arranged to be brought into contact with each other or being arranged close to each other;

a first relief pattern formed in a boundary surface between said first and second optical regions and having a first pitch distribution; and

a second relief pattern formed in a boundary surface between said second and third optical regions and having a second pitch distribution which is substantially identical with said first

pitch distribution of the first relief pattern, said first and second relief patterns being substantially aligned in a direction of an optical axis of the diffractive optical element, wherein

said first relief pattern has a wavelength dependent phase amplitude $a_1(\lambda)$, said second relief pattern has a wavelength dependent phase amplitude $a_2(\lambda)$, said diffractive element has a phase amplitude $a(\lambda)$ which is a sum of said phase amplitudes $a_1(\lambda)$ and $a_2(\lambda)$ and includes at least one peak value within the wavelength range to be used, wherein when an average refractive index of a composite relief structure constituted by the first and second relief patterns is n_0, a thickness of the diffractive element is D, and a smallest pitch of the relief patterns is T, the following condition is satisfied:

$$\frac{2\pi\lambda D}{n_0 T^2} < 1 .$$

42. (Twice Amended) A diffractive optical element comprising:

a first optical region made of a first optical material which is substantially transparent to light within a wavelength range to be used and has a refractive index n_1;

a second optical region made of a second optical material which is substantially transparent to said light but is different from said first optical material and has a refractive index n_2;

a third optical region made of a third optical material which is transparent to said light but is different from said second optical material and has a refractive index n_3, said first, second and third optical regions being arranged to be brought into contact with each other or being arranged close to each other;

a first relief pattern formed in a boundary surface between said first and second optical regions and having a first pitch distribution; and

a second relief pattern formed in a boundary surface between said second and third optical regions and having a second pitch distribution which is substantially identical with said first pitch distribution of the first relief pattern, said first and second relief patterns being substantially aligned in a direction of an optical axis of the diffractive optical element, wherein

said first relief pattern has a wavelength dependent phase amplitude $a_1(\lambda)$, said second relief pattern has a wavelength dependent phase amplitude $a_2(\lambda)$, said diffractive element has a phase amplitude $a(\lambda)$ which is a sum of said phase amplitudes $a_1(\lambda)$ and $a_2(\lambda)$ and includes at least one peak value within the

wavelength range to be used, wherein when a shortest wavelength of the wavelength range to be used is λ_1, a longest wavelength of the wavelength range to be used is λ_2, and a middle wavelength between λ_1 and λ_2 is λ_0 $(=(\lambda_1 + \lambda_2)/2)$, the following condition is satisfied:

$$\lambda_2 - \lambda_1 > 0.05\lambda_0.$$

Kindly add the following new claims.

--49. A diffractive optical element comprising:

a first optical region made of a first optical material which is substantially transparent to light within a wavelength range to be used and has a refractive index n_1;

a second optical region made of a second optical material which is substantially transparent to said light but is different from said first optical material and has a refractive index n_2, said first and second optical regions in contact with each other or disposed close to each other;

a third optical region made of a third optical material which is transparent to said light but is different from said second optical material and has a refractive index n_3, said second and third optical regions in contact with each other or disposed close to each other;

a first relief pattern formed in a boundary surface between said first and second optical regions and having a first pitch distribution; and

a second relief pattern formed in a boundary surface between said second and third optical regions and having a second pitch distribution which is substantially identical with said first pitch distribution of the first relief pattern, said first and second relief patterns being substantially aligned in a direction of an optical axis of the diffractive optical element, wherein

said first relief pattern has a wavelength dependent phase amplitude $a_1(\lambda)$,

said second relief pattern has a wavelength dependent phase amplitude $a_2(\lambda)$, and

said diffractive element has a phase amplitude $a(\lambda)$, which is a sum of said phase amplitudes $a_1(\lambda)$ and $a_2(\lambda)$, and produces a diffraction efficiency peak for at least two wavelengths within said range of the wavelengths to be used.

50. A diffractive optical element comprising:

a first optical region made of a first optical material which is substantially transparent to light within a wavelength range to be used and has a refractive index n_1;

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a second optical region made of a second optical material which is substantially transparent to said light but is different from said first optical material and has a refractive index n_2, said first and second optical regions in contact with each other or disposed close to each other;

a third optical region made of a third optical material which is transparent to said light but is different from said second optical material and has a refractive index n_3, said second and third optical regions in contact with each other or disposed close to each other;

a first relief pattern formed in a boundary surface between said first and second optical regions and having a first pitch distribution; and

a second relief pattern formed in a boundary surface between said second and third optical regions and having a second pitch distribution which is substantially identical with said first pitch distribution of the first relief pattern, said first and second relief patterns being substantially aligned in a direction of an optical axis of the diffractive optical element, wherein

said first relief pattern has a wavelength dependent phase amplitude $a_1(\lambda)$,

said second relief pattern has a wavelength dependent phase amplitude $a_2(\lambda)$,

said diffractive element has a phase amplitude a(λ), which is a sum of said phase amplitudes $a_1(\lambda)$ and $a_2(\lambda)$, and produces a diffraction efficiency peak for at least two wavelengths within said range of the wavelengths to be used,

λ is a wavelength of the light within the wavelength range to be used,

λ_1 is a shortest wavelength of the wavelength region to be used,

λ_2 is a longest wavelength of the wavelength range to be used, and

the following condition is satisfied:

$\frac{2\pi\lambda D}{n_0 T^2} < 1$, where

n_0 is an average refractive index of a composite relief structure constituted by the first and second relief patterns,

D is a thickness of the diffractive optical element, and

T is a smallest pitch of the relief patterns.

Cncl
Cont

51. A diffractive optical element comprising:

a first optical region made of a first optical material which is substantially transparent to light within a wavelength range to be used and has a refractive index n_1;

a second optical region made of a second optical material which is substantially transparent to said light but is different from said first optical material and has a refractive index n_2, said first and second optical regions in contact with each other or disposed close to each other;

a third optical region made of a third optical material which is transparent to said light but is different from said second optical material and has a refractive index n_3, said second and third optical regions in contact with each other or disposed close to each other;

a first relief pattern formed in a boundary surface between said first and second optical regions and having a first pitch distribution; and

a second relief pattern formed in a boundary surface between said second and third optical regions and having a second pitch distribution which is substantially identical with said first pitch distribution of the first relief pattern, said first and second relief patterns being substantially aligned in a direction of an optical axis of the diffractive optical element, wherein

said first relief pattern has a wavelength dependent phase amplitude $a_1(\lambda)$,

said second relief pattern has a wavelength dependent phase amplitude $a_2(\lambda)$,

said diffractive element has a phase amplitude $a(\lambda)$, which is a sum of said phase amplitudes $a_1(\lambda)$ and $a_2(\lambda)$, and produces a diffraction efficiency peak for at least two wavelengths within said range of the wavelengths to be used,

λ is a wavelength of the light within the wavelength range to be used,

λ_1 is a shortest wavelength of the wavelength region to be used,

λ_2 is a longest wavelength of the wavelength range to be used, and

a middle wavelength between λ_1 and λ_2 is $\lambda_0 = ((\lambda_1 + \lambda_2)/2)$, such that the following condition is satisfied:

$\lambda_2 - \lambda_1 > 0.05\lambda_0$.--